SECTION 05310
STEEL DECK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this section.

1.2 SUMMARY

A. Scope: Provide labor, material, equipment, related services, and supervision required, including, but not limited to, manufacturing, fabrication, erection, and installation for steel deck as required for the complete performance of the work, and as shown on the drawings and as herein specified.

B. Section Includes: Provide steel deck and related items as shown on the drawings and specified herein.

C. Related Sections: The following section may contain requirements that relate to this section:
   1. Division 5, Section 05120: Structural Steel.

1.3 RFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

B. The edition/revision of the referenced publications shall be the latest date as of the date of the Contract Documents, unless otherwise specified.

C. American Iron and Steel Institute (AISI):
   1. AISI SG-671 "Specification for the Design of Cold-Formed Steel Structural Members".

D. American Welding Society (AWS):
   1. AWS D1.3 "Structural Welding Code - Sheet Steel" (copyrighted by AWS, ANSI approved).

E. ASTM (ASTM):
   1. ASTM A 108 "Standard Specification for Steel Bars, Carbon, Cold Finished, Standard Quality".
   2. ASTM A 446 "Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality".
   3. ASTM A 525 "Standard Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process".
   4. ASTM A 526 "Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality".
   5. ASTM A 611 "Standard Specification for Steel, Sheet, Carbon, Cold-Rolled, Structural Quality".
   6. ASTM A 780 "Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings".

F. Steel Deck Institute, Inc. (SDI):
   1. SDI-28 “Design Manual for Composite Decks, Form Decks, Roof Decks, and Cellular Metal Floor Deck with Electrical Distribution".

1.4 SUBMITTALS

A. General: Submit the following in accordance with provisions of the Contract, including General and Supplementary Conditions.

B. Product Data: For information only, submit manufacturer's specifications including, but not limited to, installation instructions for each product specified, quantity and marking of deck units, size and location of holes to be cut, and erection procedures including, but not limited to, schedules, procedures, and diagrams showing sequence of erection.

C. Shop Drawings: Submit detailed shop drawings showing large scale cross-sectional detail of the decking, various connections, layouts of deck units, placement directions, bearing on structural supports, anchorage details, attachment of accessories, and every condition requiring closure panels, supplementary framing, special jointing, and other accessories. Details and layouts shall show location of supporting members, quantity and marking of decking units, size and location of holes to be cut, and the location, type, and sequence of welded connections. Shop drawings shall show the structural properties of the decking units.
   1. The Construction Manager’s review of shop drawings is to be for general arrangement and details of design, but not to figured dimensions or construction details. Compliance with requirements for materials, fabrication, and erection of metal decking shall be the Contractor's responsibility.

D. Manufacturer's Certifications: Submit manufacturer's certifications as may be required to show compliance with these specifications.

E. Certification of Welders: Provide certification that each welder has been qualified in accordance with the American Welding Society (AWS).

F. Statement of Manufacturer's Review: Submit statement of manufacturer's review, signed by the Contractor, the Installer, and the manufacturer, stating that the drawings and specifications, shop drawings, and product data have been reviewed by the manufacturer, and that they are in agreement that the selected materials and systems are proper and adequate for the application shown including, but not limited to, compatibility with adjacent materials and systems.

G. Statement of Application: Submit statement of application, in form stipulated by the Construction Manager, signed by the Contractor and the Installer, stating that the work was provided in compliance with the Contract Documents and that the installation was proper for the conditions of application and use.

1.5 QUALITY ASSURANCE

A. The following publications form a part of this specification to the extent indicated by the references thereto:
   1. AISI SG-671.
   2. AWS D1.3.
   3. SDI-28.

B. Regulatory Requirements: Comply with applicable requirements of the laws, codes, ordinances, and regulations of Federal, State, and local authorities having jurisdiction. Obtain necessary approvals from such authorities.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to the site at such intervals as shall avoid delay in the work.

B. Handling: Handle material safely and in a manner that shall prevent distortion or other damage.

C. Storage: Store material in a clean, properly drained location. Keep material off the ground under a weathertight covering permitting good air circulation. Use pallets, platforms, or other proper supports. Prevent distortion, corrosion, and other damage.
   1. Do not store materials on the structure in a manner that might cause distortion or damage to the supporting structure. Repair or replace damaged materials in an approved manner without additional cost to the Owner.

D. Corrosion Repair: Finish of decking units shall be maintained at all times, using touch-up paint whenever necessary to prevent the formation of rust. Touch-up paint for shop painted units shall be of the same type used for the shop painting. Touch-up paint for zinc coated units shall be a high zinc content, galvanizing repair paint.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Galvanized Steel Sheet: Galvanized steel sheet shall conform to ASTM A 446.

B. Sheet Metal Accessories: Comply with ASTM A 526, commercial quality, galvanized.

C. Flexible Rubber Closure Strips: Rubber closure strips shall be manufacturer's standard of vulcanized, closed cell, synthetic rubber.

D. Galvanizing: Galvanizing shall conform to ASTM A 525, G60 (0.60 ounce per square foot) for floor deck and G90 (0.90 ounce per square foot) for roof deck.
   1. Underside of steel roof and floor deck in Target Building shall receive a shop coat of primer paint applied over cleaned and phosphatized galvanizing.

E. Galvanizing Repair: Where galvanized surfaces are damaged, prepare surfaces and repair in accordance with procedures specified in ASTM A 780.

F. Roof Sump Pans: Roof sump pans shall be recessed type fabricated from a single piece of not less than 0.0785 inch thick (14 gage) galvanized sheet steel of the same quality as the deck units, with level bottoms and sloping sides to direct water flow to the drain, unless otherwise shown. Provide sump pans of adequate size to receive roof drains with bearing flanges not less than 3 inches wide. Recess pans not less than 1-1/2 inches below the roof deck surface, unless otherwise shown or required by deck configuration. Holes for drains shall be cut in the field.

G. Shear Connections: Provide headed stud type, ASTM A 108, Grade 1015 or Grade 1020, cold-finished carbon steel, with dimensions complying with AISC specifications.

2.2 FABRICATION

A. General: Deck units shall be in lengths to span three or more supports with flush, telescoped, or nested 2 inch end laps and nesting side laps, unless otherwise indicated. Deck configurations shall comply with SDI specifications and as specified herein.

B. Metal Decking: Metal decking shall be of the type shown and shall have the depth, gage, and structural properties as indicated on the drawings.
   1. Roof Deck Units: Provide deck configurations that comply with SDI-28.
   2. Noncomposite Steel Form Deck: Provide fluted sections of metal deck as permanent forms for reinforced concrete slabs.
   3. Composite Steel Floor Deck: Fabricate deck units with integral embossing or raised pattern to furnish mechanical bond with concrete slabs. Fabricate open-beam deck units with fluted section having interlocking side laps.

C. Metal Closure Strips: Fabricate metal closure strips for openings between decking and other construction of not less than 0.0516 inch thick (18 gage) galvanized sheet steel. Form to the configuration required to provide tight fitting closures at open ends and sides of decking.

D. Metal Cover Plates: Fabricate metal cover plates for end-abutting floor deck units of not less than same thickness as decking. Form to match contour of deck units and approximately 6 inches wide.

E. Ridge and Valley Plates: Fabricate ridge and valley plates of galvanized sheet steel of the same quality as the deck units, each leg not less than 2-1/4 inches wide, and bent to provide tight fitting closure with deck units. Provide plates in 10 foot lengths where possible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions under which the work is to be installed, and notify the Contractor in writing, with a copy to the Construction Manager, of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.2 FIELD INSTALLATION

A. General: Install deck units and accessories in accordance with manufacturer's and SDI-28 recommendations, final shop drawings, details on the drawings, and as specified herein. Welds shall be in accordance with AWS D1.3 or Attachment A.

B. Deck Bundles: Locate decking bundles to prevent overloading of structural members.

C. Placing of Deck Units: Place deck units on supporting steel framework with edges up and flutes at right angles to supports. Adjust to final position with ends bearing on supporting members not less than 2 inches and accurately aligned end to end before being permanently fastened. Lap ends not less than 2 inches for welded construction on roof decks. Butt end joints of composite deck. Side laps shall be half corrugation. Do not stretch or contract the side lap interlocks. Place deck units flat and square, secured to adjacent framing without warp or excessive deflections, and with close alignment between cells at ends of abutting deck units.

D. Fastening Deck Units: Unless otherwise indicated on the drawings, permanently fasten roof deck units to steel supporting members by not less than 5/8 inch diameter fusion welds, or elongated welds of equal strength, not more than 12 inches on center at supports, with a minimum of two welds per unit at each support. Deck shall function as a rigid diaphragm capable of resisting shear forces shown on the drawings.
   1. Comply with AWS requirements and procedures for manual-shielded metal-arc welding, the appearance and quality of welds, and the methods used in correcting welding work. Use welding washers where recommended by deck manufacturer.

2. Lock side laps between adjacent deck units at intervals not exceeding 18 inches on center using self-tapping No. 10 or larger machine screws, unless otherwise noted. End laps and end terminating at supports shall be fastened at each side lap plus an intermediate fastener.
3. Install and anchor roof deck units to resist gross uplift loading of 45 psf at eave overhang and 30 psf for other roof areas.

E. Mechanical Fasteners: Where mechanical fasteners are used, screws, powder-actuated fasteners, or pneumatically driven fasteners may be used in accordance with SDI requirements. Submit manufacturer's catalog information and fastener load tables for review by the Architect/Engineer.

F. Cutting and Fitting: Cut and fit deck units and accessories around other work projecting through or adjacent to the decking, as shown on the drawings. Provide neat, square, and trim cuts.

G. Metal Closure Strips: Provide metal closure strips at open uncovered ends and edges of decking, and in the voids between decking and other construction. Weld into position to provide a complete decking installation. Provide flexible closure strips instead of metal closures, at the Contractor's option, wherever their use shall ensure complete closure. Install with adhesive in accordance with manufacturer's instructions.

H. Joint Covers: Provide metal joint covers at abutting ends and changes in direction of floor deck units. Weld or use self-tapping No. 8 or larger machine screws for fastening covers to deck.

I. Shear Connections: Weld shear connectors to supports through decking units in accordance with manufacturer's instructions. Weld shear connectors in field, spaced as shown or indicated, to beams and girders in composite construction. Use automatic end welding of headed stud shear connectors in accordance with manufacturer's printed instructions. Do not weld shear connectors through two layers (lapped ends) of decking units. Weld only on clean, dry deck surfaces.

J. Ridge and Valley Plates: Weld ridge and valley plates to the top surface of the roof decking. Lap end joints not less than 3 inches, with laps made in the direction of water flow.

K. Reinforcement at Openings:
1. Provide additional metal reinforcement and closure pieces as required for strength, continuity of decking, and support of other work, unless otherwise shown or specified.
2. Reinforce roof decking around openings less than 12 inches in any dimension by means of a flat steel sheet placed over the opening and fusion welded to the top surface of the deck. Provide steel sheet of the same quality as the deck units, not less than 20 gage, and at least 12 inches wider and longer than the opening. Provide welds at each corner and spaced not more than every 12 inches along each side.
3. Openings larger than 12 inches shall be reinforced by steel angles on opposite sides of the opening and at a right angle to the deck ribs. Both sides of the angle shall be spot welded to each rib. Angle shall extend at least two ribs beyond each side of the opening.

L. Sump Pans: Place roof sump pans over openings provided in the roof decking and weld to the top decking surface. Space welds not more than every 12 inches with at least one weld at each corner. Cut openings in the bottom of the roof sump to accommodate the drain size indicated.

M. Touch-Up Painting: After decking installation, wire brush, clean, and paint scarred areas, welds, and rust spots on top and bottom surfaces of decking units and supporting steel members.
   1. Touch up galvanized surfaces with galvanizing repair paint applied in accordance with the manufacturer's instructions.
   2. Touch up prime painted deck in Target Building with repair paint applied in accordance with the manufacturer's instructions. Finish coat of paint shall be in accordance with Architectural drawings and specification Section 09900, Painting.

3.3 FIELD QUALITY CONTROL

A. General: The Contractor shall engage an independent Inspection and Testing Agency to perform shop and field inspections and tests specified herein, and prepare test reports. The extent and description of field test requirements shall be as specified hereinafter.

B. Access: Provide access for the Inspection and Testing Agency to places where structural steel work is being fabricated or produced so that required inspection and testing can be accomplished.

C. Reports: The Inspection and Testing Agency shall conduct and interpret the tests and state in each report whether the test specimens comply with the requirements, and specifically state any deviation therefrom.

D. Retesting: The Contractor's Inspection and Testing Agency shall perform such additional tests as may be necessary to reconfirm any noncompliance of the original work, and as may be necessary to show compliance of corrected work.

E. Qualification of Welders: Qualification of welders shall be the responsibility of the Contractor. Welding shall be performed by qualified welders. The qualification of welders and the duration of qualification period shall be in accordance with the requirements of AWS D1.1. Any welder found to be producing unsatisfactory work even through he has passed qualification tests shall be immediately recertified or replaced with a qualified welder.

F. The Testing Laboratory shall perform all field testing of shear studs.
   1. 10% of shear studs shall be visually inspected to confirm that a continuous 360 degree flash is present.
   2. 10% of shear studs at random shall also be tested by hammering against the side, bending it 15 degrees off perpendicular to beam. Remaining studs shall receive hammer blows to verify weld fusion to beam.
   3. Studs shall also be visually inspected for placement/spacing on the beam according to stud layout shop drawings.

ATTACHMENT A

WELD AND INSPECTION REQUIREMENTS FOR STRUCTURAL WELDS

WELD PLANNING DATA			INSPECTION REQUIRED		
Specification or Drawing No.	WPS	Spot Check	Spot Inspection	VT-F 100%	N/A
05310 Steel Deck	SMASW-1(ST)	Req'd.	Req'd.	Req'd.	

Structural WPS is included in Section 18250

VT-F = Final Visual
Spot Check = Spot observation of welding activities for compliance with the specification by a person designated by the welder's employer other than the welder.
Spot Inspection = Oversight to verify conformance to the welding program. Include at least 5% of functions not included in the required examinations.

END OF SECTION 05310